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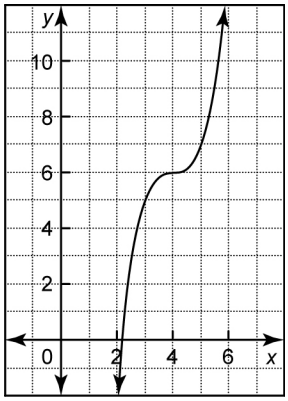
Chapter 4 Test

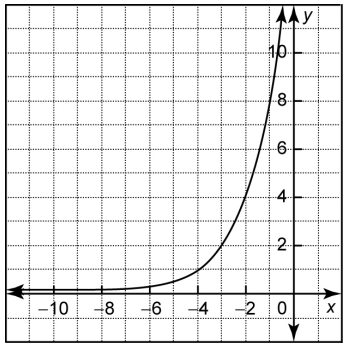
Choose the best answer for questions 1 to 5.

1. Which graph represents a quadratic relation?

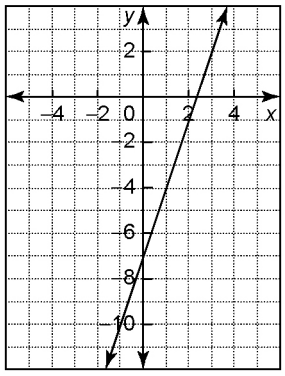
A



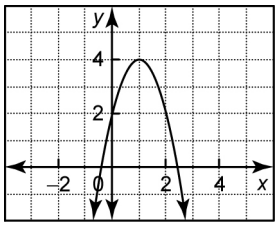
B



C



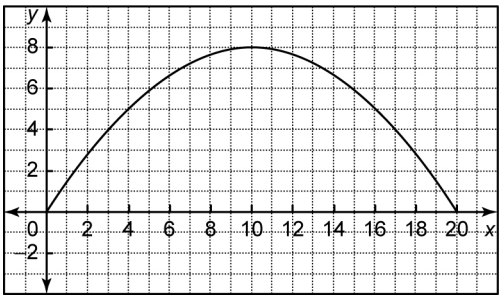
D



2. Which of these quadratic relations opens upward?

A $y = -3(x + 4)^2$ **B** $y = 0.25x^2 - 1$
C $y = 3(x + 2)^2 + 5$ **D** Both B and C

3. The graph shows the path of a soccer ball after it was kicked. The x-values represent the horizontal distance travelled and the y-values represent the height of the ball, both in metres.



How far does the ball travel before it hits the ground?

A 10 m **B** 20 m
C 40 m **D** 8 m

4. Which set of transformations to the graph of $y = x^2$ would give the parabola $y = -3(x - 2)^2 + 5$?

A A reflection in the x-axis, a vertical stretch by a factor of 3, a translation of 2 units right and 5 units up.

B A reflection in the x-axis, a vertical stretch by a factor of 3, a translation of 2 units left and 5 units down.

C A reflection in the y-axis, a vertical compression by a factor of 3, a translation of 2 units right and 5 units up.

D A reflection in the y-axis, a vertical stretch by a factor of 3, a translation of 2 units and 5 units up.

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5. The relation $y = -2(x + 4)^2 - 3$ has
A a maximum at (4, –3)
B a minimum at (4, –3)
C a maximum at (–4, –3)
D a minimum at (–4, –3)

6. Which relations are quadratic? Justify your answers.
a) $y = x^2 + 4$
b) $y = 4x + 6$
c) $y = 2^{2+x}$
d)

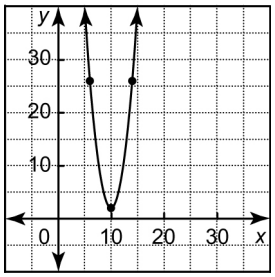
x	y
–3	19
–2	9
–1	3
0	1
1	3
2	9
3	19

7. Describe the shape relative to $y = x^2$, the orientation, and coordinates of the vertex of each quadratic relation.
a) $y = 2(x + 2)^2$ **b)** $y = -0.5x^2 - 3$
c) $y = (x - 3)^2 + 8$ **d)** $y = -3(x - 1)^2 - 2$

8. Which parabola in each pair would have its vertex farther from the y-axis? Explain.
a) $y = 5(x - 4)^2$ $y = -4(x + 2)^2$
b) $y = x^2 - 2$ $y = -x^2 + 2$
c) $y = 3(x - 3)^2 + 9$ $y = -0.5(x + 4)^2 + 8$
d) $y = (x - 1)^2$ $y = 3(x + 1)^2 - 1$

9. Refer to question 8. Which parabola in each pair would have its vertex farther from the x-axis? Explain.

10. Part of the track on an amusement ride is parabolic. The shape of this parabolic track is represented by the graph. On the graph, x represents the horizontal distance and y represents the height above the ground, both in metres.



a) Write a relation that represents the shape of the parabolic track.
b) A 2-g force is a force that makes you feel as if you are twice as heavy, such as the force that pushes you into the seat on a roller coaster. Riders experience a 2-g force at a horizontal distance of 9 m on the parabolic track. At what height do riders feel this effect?
c) What is the closest distance the parabolic track comes to the ground? At what horizontal distance does this occur?

11. An arch at the entrance to a tunnel is in the shape of a parabola. The shape of the arch can be modelled by the relation $h = -0.5x(x - 16)$, where h is the height above the road and x is the horizontal distance, both in metres.
a) Graph the relation.
b) Use your graph to locate the vertex of the arch. Interpret the meaning of the coordinates of the vertex in this context.
c) What is the height of the opening at a distance 2 m from the base of the arch?
d) A truck is carrying a large crate 8 m wide by 23 m high. Can the truck pass through the tunnel? Explain.